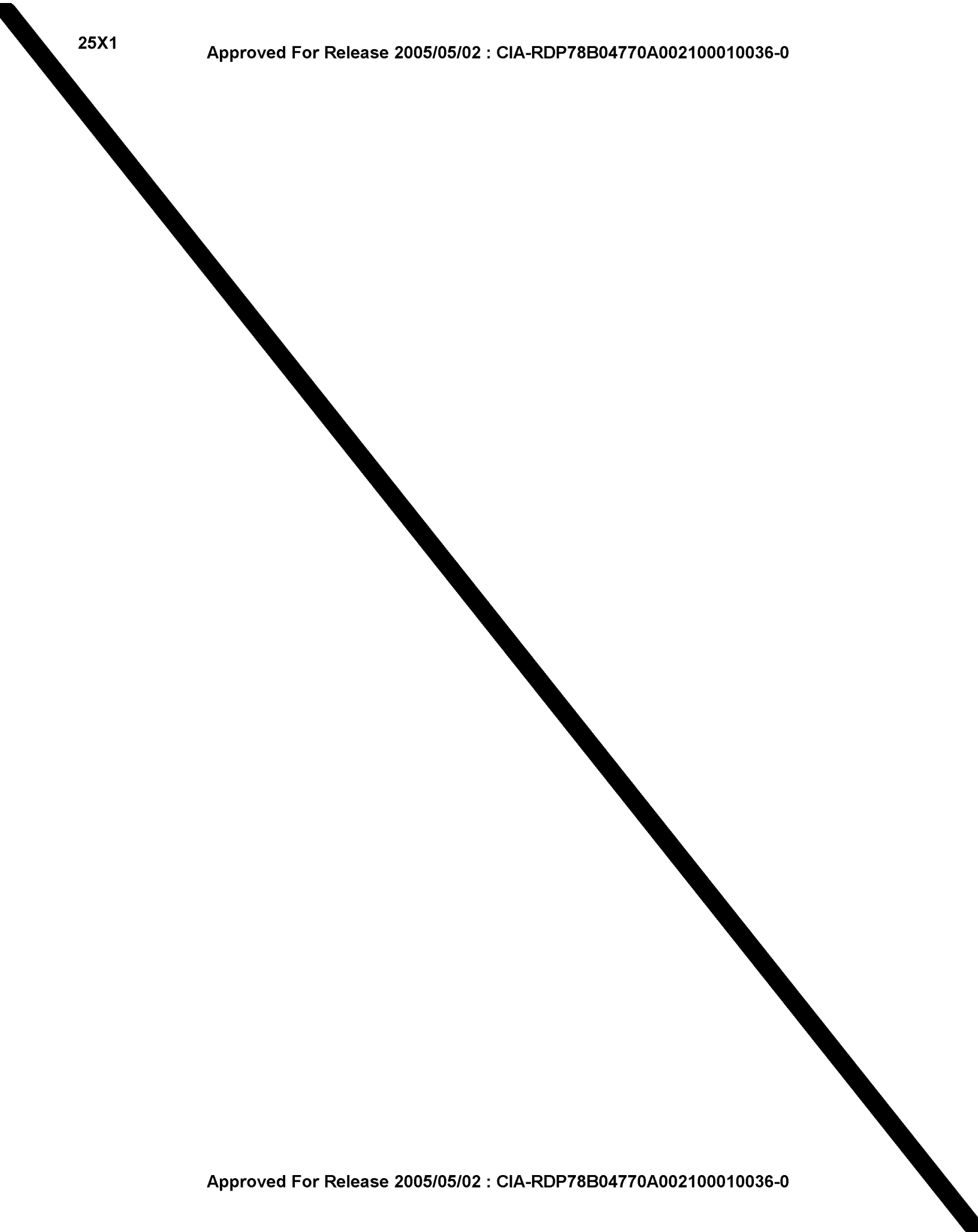

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10 February 1964

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MEMORANDUM FOR: Chairman, Technical Development Committee

THROUGH : Executive Secretary, TDC

25X1 SUBJECT : Staff Study [redacted] Proposal for Automatic Photographic Identification System, RFP No. TP-191, dated January 1964

1. PROBLEM:

To alleviate the anticipated photointerpretation workload by partial automation.

2. FACTS:

a. Automation of image identification has been successfully accomplished in several specialized areas:

(1) An automatic system for identifying anomolies in white blood cells caused by low level radiation exposure has been developed jointly 25X1 by [redacted] and the [redacted] Detection of this anomoly requires a resolution of one-tenth of a micron or 10,000 lines/mm and capability to discriminate occurrences at a rate of only 1 in 3000. Not only is this process tedious for the microscopist, but it is one he does not perform well. The automation system has improved the percentage of successful detection and relieved the human operator for tasks more suited to his ability.

25X1 (2) A similar type of automation is under development at the [redacted] for analysis for x-ray photographs to determine whether or not an intestinal ulcer is malignant.

(3) More close to home are automatic systems for identifying radar returns on a real-time basis. A real improvement in performance of submarine detection has been achieved by automatic analysis of radar returns. The monotony of examining these returns for hours on end without interruption does not fatigue the automatic system. Many other classes of electronic signal patterns have been programmed into successful automatic recognition systems.

b. The rate of acquisition of reconnaissance materials is steadily on the increase. This acquisition is already automated to a great degree, so that the number of people required to exploit the take greatly exceeds the number directly involved in its acquisition.

[redacted]

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c. COMOR plans indicate that by 1968 the following expansions in the acquisition phase are contemplated:

(1) Immediate readout capability. Within 48 hours of an indicated surveillance requirement, it is intended that coverage could have been flown, recovered and reported out.

(2) Extended coverage. Coverage of the Soviet Bloc, having 5-10 feet of ground resolution, is to be acquired every 45 days and read out within a week. Additionally, there will be surveillance coverage of 2000-3000 priority targets to be acquired on a monthly basis. Again, readout within one week will be required.

(3) Multi-sensor analysis. Acquisition will involve multiband visual [redacted] These systems will require analysis procedures having little in common with present PI techniques; and for full exploitation, the various systems must be correlated and integrated.

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d. Many systems under study for achieving varying degrees of automation of the PI process have been evaluated; including those under development at [redacted]

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e. The work at [redacted] has resulted in the proof of feasibility for developing an Automated Radar Jamming Mode Selector. They are now under contract with Wright-Patterson Air Force Base to develop the first operational prototype. This system analyzes radar signals in the electronic form and is the basis for the concepts that were later materialized in the adaptive computer system called CONFLEX. The CONFLEX is an excellent, compact, economical implementation of the PERCEPTRON concept with the exception that the logic is built on correlation rather than identity.

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f. Under contract with RADC, [redacted] developed the conical transform for normalizing photo-images before submitting them to the CONFLEX for learning and recognition. This converts an image into a signal which is relatively invariant with respect to image orientation.

g. The conical transform is an implementation for generating the power density spectrum of an image through a scanning technique, which does not require coherent illumination and consequently, does not have the attendant problems. [redacted] of P&DS, who is a recognized expert in this field, has evaluated this technique and judged it to be original, ingenious and promising.

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h. The subject proposal projects a study program for exploring means of optimization of these two systems to develop techniques for:

(1) Automatic classification of photographs as urban, industrial, rural, desolate, etc.

(2) Automatic identification of targets and objects, such as airfields, factories, ports, shipyards, POL areas, aircraft, ships, tanks, etc.

[redacted]

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i. There is no proposal for producing deliverable hardware. Successful completion of the proposed study would mean that feasibility for development of systems for automatically accomplishing the classification and identification tasks described above have been theoretically and empirically established. Such feasibility would be demonstrated by breadboards and fully documented by photography, data and technical analysis.

3. CONCLUSIONS:

a. Operational developments exist which indicate the feasibility of partial automation of the image identification process.

b. The anticipated rate and complexity of intelligence acquired through various sensor systems, coupled with the increasing urgency of the time aspect indicates the need for accelerated development of automation techniques in the exploitation phase.

c. The developments already achieved at [redacted] the evidence of ingenuity and the high degree of motivation exhibited by their staff, when viewed in direct comparison with other organizations working toward the same end, give promise of significant achievement through the study program described in the subject proposal.

4. RECOMMENDATIONS:

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[redacted] be awarded a CPFF level of effort type contract in accordance with the subject proposal and covering letter, dated 24 January 1964, which indicates a budgetary estimate o[redacted]for the study program.

[redacted]

Development Branch, P&DS

[redacted]